

Appendix C

rev 3/1/06

| Test | Modification |
|-----------------|--|
| AASHTO T 30-03 | Section 6.2 thru 6.5 Samples are not routinely washed |
| AASHTO T 40-02 | All sampling during production shall be from the ground tank. Upon request by the DRM, a 1-qt sample shall be taken after 1-gal (minimum) is drained off. |
| AASHTO T 164-05 | <p>Method A</p> <p>APPARATUS:</p> <p>Section 5 ConnDOT in addition to AASHTO apparatus includes infrared lamp and substitutes graduated cylinder with a 1000 ml flask.</p> <p>Section 6. Reagent. Must be Conn D.O.T. approved *****</p> <p>Article 8.2.1 all classes of HMA except Class 4 are scooped from the sample container.</p> <p>Section 9.1 and 9.2 Moisture content is periodically determined on production samples as plant conditions require.</p> <p>Section 11.1 See Section 9.0 AASHTO T 164</p> <p>Section 11.3 and 11.5 Filter paper is dried and weighed in field using heat lamp or oven when an ash test is performed.</p> <p>Section 11.6.2 Extract is collected if an ash test is to be performed</p> <p>Section 11.6.2 Performed on selected samples only</p> <p>Section 11.6.2 A three test running average is used to correct for total binder in HMA.</p> |
| AASHTO T 166-05 | NOT MODIFIED |
| AASHTO T 168-03 | <p>Section 4.1: Samples are taken at one point in the pile instead of two samples 180 degrees from each other. All classes of bituminous concrete except Class 4 are scooped from the sample container instead of remixing and quartering. (Method verified by laboratory study).</p> <p>Section 4.3: Samples from a hauling vehicle are taken from only one point instead of four as specified.</p> <p>Selection of Samples: Sampling is equally important as the testing, and the sampler shall use every precaution to obtain samples that are truly representative of the bituminous mixture.</p> <p>Box Samples: In order to enhance the rate of processing samples taken in the field by construction or maintenance personnel, the box samples requested by laboratory will immediately be given Laboratory numbers. The samples will be tested in the order received and data processed to be determine conformance to material specifications and to prioritize inspections by laboratory personnel. The only exception to this procedure will be if the field inspectors suspect nonconformance of material specifications and request priority testing for acceptance or rejection.</p> |
| AASHTO T-170-00 | <p>Recovery of Asphalt from Solution by Abson Method</p> <p>Delete the referenced section and replace with the language shown:</p> <p>5.0 Apparatus</p> <p>Centrifuge batch unit capable of exerting a minimum centrifugal force of 770 times gravity or a continuous unit capable of exerting a minimum force of 300 times gravity.</p> <p>5.1. Centrifuge tubes- a 250ml wide mouth bottles</p> <p>5.2. Extraction Flasks- a 500ml three angle necks and joints flask with 24/40 side necks.</p> <p>5.3.2. Glass Tubing- Heat resistant glass tubing, having 10mm inside diameter and a gooseneck shaped delivery tube, for connecting the flask to the condenser.</p> <p>5.3.3. Inlet Aeration Tube- 180mm in length having a 6mm outside diameter with a 10-mm bulb carrying six staggered holes approximately 1.5 mm in diameter.</p> |

Appendix C

rev 3/1/06

| Test | Modification |
|--------------------|--|
| | <p>5.3.4. Electric Heating Mantle- Variable transformer to fit a 500 ml flask.</p> <p>5.3.5 Water-jacketed Condenser, Alliham type, with 200 mm minimum jacket length.</p> <p>5.3.6. Thermometer- an ASTM low distillation thermometer having a range of –2 to 300_C (30 to 580_F), respectively, and conforming to the requirements in ASTM specification E 1</p> <p>5.3.7. Gas Flow Meter- A type capable of indicating a gas flow of up to 1000 ml per minute.</p> <p>5.3.8. Corks. NO. 20</p> <p>5.3.9. Flexible Elastometric Tubing-</p> <p>5.3.10. Separatory Funnel 500 ml capacity or larger</p> <p>6.0. Reagents and Materials</p> <p>6.1. Carbon Dioxide Gas- A pressurized tank, with pressure-reducing valve. The solvent for extracting the asphalt from the mixtures should be reagent grade trichloroethylene or methylene chloride. Other solvents may affect the bitumen to change its properties significantly from that as it exists in the mixture.</p> <p>8. Sample</p> <p>8.1. The sample shall consist of the solution from previous extraction of a sample of sufficient mass to result in approximately 105 to 110 g of recovered bitumen.</p> <p>9. Procedure</p> <p>9.1. The entire procedure, from the start of the extraction to the final recovery, must be completed within 8 hours.</p> <p>9.2 Centrifuge the solution from the previous extraction for a minimum of 30 minutes at 770 times gravity (approx. 2700rpm) in 250 wide mouth bottles.</p> <p>Assemble the apparatus as shown in figure 1 with the separatory funnel in the thermometer hole in the cork. Lower the aeration tube so that the bulb is in contact with the bottom of the flask. Fill the separatory funnel with the centrifuged solution and open the stopcock to fill the flask approximately one-half full of solvent mixture. Apply low heat to the flask and start distillation. Introduce carbon dioxide gas at a low rate (approx. 100mL/minute) to provide agitation and prevent foaming. Adjust the funnel stopcock to introduce fresh solvent at a rate that will keep the flask approximately one half full during distillation, adding additional solvent mixture to the funnel into all solvent has been introduced into the distillation flask. When the temperature reaches 157 to 160_C (315 to 320_F), increase the carbon dioxide gas flow to approximately 900mL/minute. Maintain this gas flow rate for 20 minutes while also maintaining the temperature of the residue in the flask at 160 to 166_C (320 to 330_F).</p> |
| AASHTO T 176-02 | <p>Section 4.2 Obtain enough material to yield slightly more than eight 85 ml (3 oz) tins</p> <p>Section 5. Procedure</p> <p>5.4.1 Samples must be run at 45 seconds and 10 minutes</p> <p>5.4.2 Omit manual shaker method,</p> <p>5.4.3 Omit Hand Method</p> |
| AASHTO T 195-98 | <p>Section 3.3 only one truck load of mixture is sampled. Samples are taken from opposite sides of the load.</p> |
| AASHTO | <p>Section 6.4 Bowl is suspended 2 minutes prior to reading rather than 10 minutes. This makes no</p> |

Appendix C

rev 3/1/06

| Test | Modification |
|--------------------|---|
| T 209-05 | significant difference in results. 8.3 Omit Pycnometer method. |
| AASHTO T 238 | Section 1.2 Method C - Air gap is not used (Backscatter) Section 10.3.7 At each test location 4 readings shall be taken and averaged. Each reading shall be a minimum of 30 seconds. |
| AASHTO T 245-04 | Section 3.3.1 A molding temperature of 140 to 146 C is used Section 3.5.1 Seventy-five (75) blows per side are used on Classes 1 and 12, per ConnDOT design requirements Section 3.1 for production testing: one specimen is molded for each extraction test (generally five molds per day) for production over 275 metric tons/day. Other mixtures: two specimens per extraction test. |
| AASHTO T 275-00 | Replaced by AASHTO TP-69-04 |
| AASHTO T 283-03 | This protocol shall be performed at the HMA plant in accordance with section 7 on class 12.5 (all applicable levels) by the Contractor or their representative at a time designated by the DRM |
| AASHTO M156 | <p>AASHTO M156 (M) STANDARD SPECIFICATIONS FOR BITUMINOUS MIXING PLANTS</p> <hr/> <p>Terminology</p> <p><u>Batch Plant</u>: A manufacturing facility for producing bituminous paving mixtures that proportions the aggregate and bituminous constituents into the mix by weighed batches, adds bituminous material by either weight or volume, and mixes the blend.</p> <p><u>Drum Mix Plant</u>: A manufacturing facility for producing bituminous paving mixtures that continuously proportions aggregates, heats and dries them in a rotating drum, and simultaneously mixes them with a controlled drum, and simultaneously mixes them with a controlled amount of bituminous material. The same plant may produce cold-mixed bituminous paving mixtures without heating and drying the aggregate.</p> <p>4. REQUIREMENTS FOR ALL PLANTS</p> <p>4.1 Uniformity – The plant shall be capable of uniformly combining and mixing various sizes of aggregate from stockpiles reclaimed asphalt pavement, if required, and bituminous material.</p> <p>4.1.1 Plants producing material during nighttime hours shall have suitable lighting at the sample platform and surrounding areas for the inspector to obtain samples safely.</p> <p>4.1.2. The plant shall have a capacity of at least producing 125 tons per hour, and a minimum of four (4) cold-feed storage bins unless otherwise approved by the Director of Research and Materials.</p> <p>4.1.3. The cold-feed storage bins shall be constructed and loaded by equipment and methods that prevent intermixing or contamination of the cold-feed aggregates.</p> <p>4.1.4 HMA mixtures may be stored in bins especially designed for that purpose at the mixing plant site.</p> <p>4.1.5. The HMA mixtures used from the bins shall be of a uniform quality and meets all the specification requirements for the particular mix involved.</p> <p>4.1.6. Scalping screens or similar devices shall be installed in the cold-feed system, to remove any debris or other foreign material in excess of 4 inches.</p> <p>4.1.7. Individual bins shall be labeled for the aggregate sizes being used.</p> <p>4.1.8. The plant shall have at hand a sufficient number of standard 50-lb test weights for frequent testing of all scales. In addition to complying with the above requirements, the weighing</p> |

Appendix C

rev 3/1/06

| Test | Modification |
|------|--|
| | <p>equipment shall be constructed with the necessary adjustable devices that will permit any part thereof that is out of alignment or adjustment to be easily readjusted so that the weighing device will function properly.</p> <p>4.1.9. Scales will be checked and sealed by the Weights and Measures Division at least annually and more often if deemed necessary.</p> <ol style="list-style-type: none"> For each day's production, each ConnDOT project(s) shall be provided a clear, legible copy of the recording. Provisions shall be made so that scales used to load the hauling vehicles may not be manually manipulated during the printing process. In addition, the system shall be interlocked to allow printing only when the scale has come to a complete rest. <p>4.2 Equipment for Preparation of Bituminous Material:</p> <p>4.2.1 Tanks for storage of bituminous material shall be equipped for heating the material, under effective and positive control at all times, to the temperature required in the paving mixture specifications. Heating shall be by steam or oil coils, electricity, or other means such that no flame shall contact the heating tank.</p> <p>4.2.1.1. Hot storage tanks shall be equipped with thermometers and means for positive control of asphalt temperature at all times. Storage tank capacity shall be such as to ensure continuous operation of the plant and uniform temperature of the asphalt material when it is introduced into the aggregate.</p> <p>4.2.1.2 The lines and valves shall be so arranged that there is no contamination when different binders are used for different mixes.</p> <p>4.2.1.3 Each tank shall be equipped with an accessible valve in the lower half of the bulkhead whereby liquid samples may be taken.</p> <p>4.2.2. The circulating system for the bituminous material shall be of adequate capacity to provide proper and continuous circulation between storage tank and proportioning units during the entire operating period.</p> <p>4.2.2.1 The discharge end of the bituminous material circulating pipe shall be kept below the surface of the bituminous material in the storage tank to prevent discharging the hot bituminous material into the open air.</p> <p>4.2.2.2 All pipe lines and fittings shall be steam or oil-jacketed or otherwise properly insulated to prevent heat loss. When the bituminous material is emulsified asphalt, provisions should be made in the bitumen transfer system that will enable the operator to turn off or reduce the heat media from all lines, pumps, and jacketed bituminous material buckets as soon as the system is open and circulating properly.</p> <p>4.2.3. Storage tank capacity shall be such as to ensure continuous operation of the plant and uniform temperature of the bituminous material when it is introduced into the aggregate. Tanks shall be calibrated accurately to 100-gal (378.5-L) intervals and shall be accessible for measuring the volume of bituminous material at any time.</p> <p>4.2.4. When filled or native bituminous materials are used, means shall be provided for agitation to maintain a uniform product.</p> <p>4.2.3 Mineral Filler – Adequate dry storage shall be provided for mineral filler, when required, and provision shall be made for accurate proportioning.</p> <p>4.2.4 Cold Aggregate Feeder – The plant shall be provided with mechanical means for uniformly feeding the aggregates into the dryer so that uniform production and temperature may be assured. When aggregates must be blended from two or more bins at the cold feed to meet the requirements of the paving mixture specifications, a synchronized proportioning method shall be provided.</p> <p>4.4.1 If recycling capability is required, the plant shall be equipped with mechanical means for feeding the desired weight of reclaimed asphalt pavement into the mix. Facilities shall be provided for obtaining samples of the reclaimed asphalt pavement.</p> <p>4.5 Dryer – A dryer of satisfactory design capable of drying and heating the aggregate to the moisture and temperature requirements of the paving mixture specifications shall be provided.</p> |

Appendix C

rev 3/1/06

| Test | Modification |
|------|--|
| | <p>4.6 Bituminous Control Unit:</p> <p>4.6.1 Satisfactory means, either by weighing or metering, shall be provided to obtain the proper amount of bituminous material. Accuracy of the metering devices shall be within 1.0% of the actual weight being measured when that weight has been determined using another measuring device and shall be within 0.5% when that weight has been determined using test weights. Bituminous material scales shall conform to 8.5.</p> <p>4.6.2 Suitable means shall be provided, either by steam or oil jacketing, or other insulation, for maintaining the specified temperature of the bituminous material in the pipe lines, meters, weigh buckets, spray bars, and other containers or flow lines.</p> <p>4.7 Thermometric Equipment:</p> <p>4.7.1 An armored recording thermometer of suitable range shall be fixed in the bituminous material feed line at a suitable location near the discharge at the mixer unit.</p> <p>4.7.2 Approved recording thermometers, pyrometers, or other recording thermometric instruments shall be fixed at the discharge chutes of the dryer and, when applicable, in the hot fines bin to register and record automatically the temperature of the heated aggregate or heated mixture.</p> <p>4.7.2.1 The Director of Research and Materials reserve the right to pass upon the efficiency of the pyrometer; and for better regulation of the aggregate temperature, he may direct the replacement of the instrument by some approved temperature-recording apparatus and may further require that daily temperature charts be filed with him.</p> <p>4.8 Emission Controls:</p> <p>4.8.1 A dust collection system shall be provided. The system shall be made to waste the material so collected, or to return all or any part uniformly to the mixture.</p> <p>4.8.2 Other emissions, such as smoke but excepting water vapor, shall be controlled to be in compliance with applicable limits.</p> <p>4.9 Surge and Storage Bins – If bins are used for surge or storage, they shall be such that mixture drawn from the bin meets the requirements of the paving mixture.</p> <p>4.10 Safety Requirements:</p> <p>4.10.1 Adequate and safe stairways to the mixer platform shall be provided if applicable. Guarded ladders to other plant units shall be located where required.</p> <p>4.10.2 All gears, pulleys, chains, sprockets, and other dangerous moving parts shall be thoroughly protected.</p> <p>4.10.3 Ample unobstructed space shall be provided on the mixing platform if applicable.</p> <p>4.10.4 An unobstructed passage shall be maintained at all times in and around the truck loading space. This space shall be kept free of drippings from the mixing platform. A ladder or platform shall be located at the truck loading space to permit easy and safe inspection of the mixture as it is delivered into the trucks. Overhead protection shall be provided where necessary.</p> <p>6. Requirements for Plants Controlling Gradation of Hot Dry Aggregates</p> <p>6.1 Plant Screens</p> <p>6.1.1 Plants shall be equipped with plant screens located between the dryer and hot aggregate bins and shall have adequate capacity and size range to separate the heated aggregate into the size required for proportioning so that they may be recombined consistently within the specification limits.</p> <p>6.1.2 The nominal maximum size aggregate in the fines bin shall be specified. The screen type and size shall be determined by the operator. No aggregate shall be larger than the maximum specified.</p> <p>6.1.3 Control shall be based on frequent bin samples tested in accordance with Test Method C 136. Aggregate in each bin, including mineral filler, shall be combined in proper proportions, and the composite shall be checked for compliance with the paving mixture specifications.</p> <p>6.2 Hot Mix Bins:</p> <p>6.2.1 Hot Bin Storage of sufficient capacity to ensure uniform and continuous operation shall be provided. Bins shall be divided into the specified number of compartments arranged to</p> |

Appendix C

rev 3/1/06

| Test | Modification |
|------|--|
| | <p>ensure separate and adequate storage of appropriate fractions of the aggregate.</p> <p>6.2.2. Each compartment shall be provided with an overflow chute of such size and at such a location to prevent any backing up of material into other compartments or into contact with the screen.</p> <p>6.2.3. Bins shall be equipped with "tell-tale" devices to indicate the position of the aggregate in the bins at the lower quarter points. An automatic plant shut off shall be provided to operate when any aggregate bin becomes empty.</p> <p>6.2.4. Adequate and convenient facilities shall be provided for obtaining aggregate samples from each bin.</p> <p>7. Requirements for Plants Controlling Gradation of Cold, Damp Aggregates.</p> <p>7.1 Maximum Aggregate Size – Oversize aggregate shall be rejected by suitable methods or devices before the aggregate enters the cold feed, or by plant screens complying with 6.1.</p> <p>7.2 Cold Feed Bins:</p> <p>7.2.1 Cold feed bins for storing aggregates prior to proportioning shall be equipped with "tell-tale" devices to indicate the position of the aggregate in the bins at the lower quarter points. An automatic plant shut-off shall be provided to operate when any aggregate bin becomes empty or the flow from any bin gate becomes restricted.</p> <p>7.2.2 Adequate and convenient facilities shall be provided for obtaining samples of the full flow of aggregate from each cold feed bin and from the total cold feed.</p> <p>7.2.3 Adequate and convenient facilities shall be provided for diverting aggregate flow into trucks or other suitable containers to check the accuracy of the aggregate delivery system.</p> <p>7.2.4 Control shall be based on frequent samples from each cold-feed bin and the total cold feed tested by Test Method C136. Results of total cold feed samples shall be checked for compliance with the paving mixture specifications.</p> <p>8. REQUIREMENTS FOR BATCH PLANTS</p> <p>8.1 Control of Aggregate Gradation – The plant shall be equipped to control aggregate gradation in accordance with the requirements of either Section 6 or Section 7.</p> <p>8.1.1 The mixer shall be a batch mixer of an approved twin pug mill type, suitably jacketed, of not less than 2,000 pounds capacity, equipped with a sufficient number of paddles or blades and set in proper order to produce properly mixed batches of any material required under these specifications.</p> <p>8.1.2 When the blade clearance exceeds $\frac{3}{4}$ inch, either the shortened blades or the worn liners, or both, shall be replaced to reduce the clearance to $\frac{3}{4}$ inch or less.</p> <p>8.1.3 The mixing blades of the pug mill shall be so set that they shall circulate the mixture in the pug mill in a horizontal direction around the mill, unless otherwise approved by the Director of Research and Materials.</p> <p>8.2 Weigh Box or Hopper</p> <p>8.2.1 Means shall be provided for weighing aggregate from each bin into a weigh box or hopper, suspended on scales and ample in size to hold a full batch.</p> <p>8.2.2 The weigh box or hopper shall be supported on fulcrums and knife edges that will not easily be thrown out of alignment or adjustments.</p> <p>8.2.3 Gates, both on the bins and the hopper, shall not leak.</p> <p>8.3. Aggregate Scales;</p> <p>8.3.1. Scales for any weigh box or hopper may be either beam or springless dial type and shall be of standard make and design. The accuracy of the weighing device shall be within 1.0% of the actual weight being measured when that weight has been determined using another measuring device and shall be within 0.5% when that weight has been determined using test weights.</p> <p>8.3.2. The change in load required to alter noticeably the position of rest of the indicating element (or elements) of a nonautomatic indicating scale shall not be greater than 0.1% of the nominal scale capacity.</p> <p>8.3.3. Beam type scales shall be equipped with a device to indicate that the required load is being</p> |

Appendix C

rev 3/1/06

| Test | Modification |
|------|--|
| | <p>approached. This device shall indicate at least the last 200 lb (91 kg) of the load.</p> <p>8.3.4. Graduation intervals for either beam or dial scales shall not be greater than 0.15 of the nominal scale capacity. Scale graduations and markings shall be plainly visible.</p> <p>8.3.5. On dial scales, parallax effects shall be reduced to the practical minimal with clearance between the indicator index and scale graduations not exceeding 0.06 in. (1.5 mm).</p> <p>8.3.6. Scales shall be equipped with adjustable pointers for marking the weight of each material to be weighed into the batch.</p> <p>8.3.7. Not less than ten test weights, each of 50 lb (22.7 kg) nominal weight and each stamped with its actual weight to within $\pm 0.05\%$ shall be provided for the purpose of testing and calibrating the scales. For each scale a suitable cradle or platform shall be provided for applying the test loads. The test weights shall be kept clean and conveniently located for calibration of the scale.</p> <p>8.4 Bituminous Material Bucket:</p> <p>8.4.1 If a bucket is used, it shall be large enough to handle a batch in a single weighing</p> <p>8.4.2 The filling system and bucket shall be of such design, size and shape that the bituminous material will not overflow, splash or spill outside the bucket during filling and weighing.</p> <p>8.4.3 The time required to add the bituminous material shall not exceed 20 s. Where the quantity of bituminous material is metered, provision shall be made to check the delivery of the meter by actual weight.</p> <p>8.4.4 The bucket shall be steam or oil jacketed or equipped with properly insulated electric heating units. It shall be arranged to deliver the bituminous material in a thin uniform sheet or in multiple sprays over the full length of the mixer.</p> <p>8.5 Bituminous Material Scales – Scales for the weighing of bituminous material shall meet the requirements for aggregate scales, as specified in 8.3 except a device to indicate at least the last 20 lb (0.1 kg) of the approaching total load shall be provided. Beam type scales shall be equipped with a tare beam or adequate counterbalance for balancing the bucket and compensating periodically for the accumulation of bituminous material on the bucket.</p> <p>8.6 Mixer Unit for Batch Method:</p> <p>8.6.1 The plant shall include a batch mixer of an approved twin shaft pugmill type capable of producing a uniform mixture.</p> <p>8.6.1.1. The mixture shall be designed to provide means of adjusting the clearance between the mixer blades and liner plates to ensure proper and efficient mixing.</p> <p>8.6.1.2. If not enclosed, the mixer box shall be equipped with a dust hood to prevent loss of dust by dispersion.</p> <p>8.6.1.3. The mixer shall be constructed to prevent leakage of the contents.</p> <p>8.6.1.4. Mixer discharge shall not cause appreciable segregation.</p> <p>8.6.2 The mixer shall be equipped with a positive means for governing mixing time and an accurate time lock to control the operation of a complete mixing cycle by locking the weight box gate after the charging of the mixer until closing of the mixer gates at the completion of the cycle; it shall lock the bituminous material bucket throughout the dry mixing period and shall lock the mixer gate throughout the dry and wet mixing periods.</p> <p>8.6.2.3 If required by the specifications, a mechanical batch counter shall be installed as part of the timing device and shall be designed to register only completely mixed batched.</p> <p>8.7 Automation of Batching:</p> <p>8.7.1 If required by the specifications, an automatic weighing, cycling, and monitoring system shall be installed as part of the batching equipment.</p> <p>8.7.2 The system shall include equipment for accurately proportioning the various components of the mixture by weight or by volume in the proper order, and equipment for controlling the cycle sequence and timing of mixture operations. There shall be auxiliary interlock cut-off circuits to interrupt and stop the automatic batching operations whenever an error exceeding the acceptable tolerance occurs in proportioning.</p> <p>8.7.2.1 Each batch shall be kept separate throughout the weighing and mixing operations.</p> <p>8.7.3 The automatic proportioning system shall be capable of consistently delivering component materials for any batch size within the following tolerances of the target weight(s):</p> |

Appendix C

rev 3/1/06

| Test | Modification |
|------|--|
| | <p>a. Aggregate (each bin) $\pm 1.5\%$ of the weight of aggregate</p> <p>b. Mineral Filler $\pm 0.5\%$ of the total batch weight,</p> <p>c. Asphalt Material $\pm 0.1\%$ of the total batch weight,</p> <p>d. Zero Return (Aggregate) $\pm 0.5\%$ of the total batch weight,</p> <p>e. Zero Return (Asphalt Material) $\pm 0.1\%$ of the total batch weight</p> <p>Control of the proportioning system shall be immediately adjusted if proportions are found to be outside the tolerances.</p> <p>Recording equipment shall monitor the batching sequence of each component of the mixture and produce a printed record of these operations.</p> <p>For each day's production, each ConnDOT project(s) shall be provided a clear, legible copy of the recording.</p> <p>There will be provisions so that scales may not be manually manipulated during the printing process. In addition, the system shall be interlocked to allow printing only when the scale has come to a complete rest.</p> <p>A printed character (asterisk or other) shall automatically be printed on the batch plant printout whenever the automatic batching sequence is interrupted or switched to auto manual or manual during the proportioning of a mixture.</p> <p>8.7.4 The electrical circuits for the above delivery tolerances of each cut-off interlock shall be capable of providing the total span for the full allowable tolerance for maximum batch size. Tolerance controls shall be automatically or manually adjustable to provide spans suitable for less than full-size batches (Note 1). The automatic controls and interlock cut-off circuits shall be capable for being consistently coordinated with the batching scale or meter within an accuracy of 0.2% of the nominal capacity (Note 2) of said scale or meter throughout the full range of the batch sizes.</p> <p>Note 1 – If separate tolerance controls are not provided for the batching of mineral filler, it will be necessary to reduce the aggregate tolerances to $\pm 0.5\%$ for those batches requiring mineral filler.</p> <p>Note 2 – The term “nominal capacity” of a scale or meter where referred to herein is defined as the maximum quantity which the scale or meter is capable of measuring.</p> <p>8.8.2 If a digital tape or ticket recorder is used, it shall record the proportions as indicated on the batching scale or meter within an accuracy of 0.5% of maximum batch size.</p> <p>8.8.3 If graphical recording is used, it shall be designed so that the stylus will traverse at least 9 in. (229 mm) of the recorder width for the total aggregate weight and maximum bituminous material weight or volume; the preceding based on maximum batch size.</p> <p>8.8.3.1 The charts shall be designed so that all quantities, including zero can be read directly and shall have a resolution of at least ten lines per inch. The chart speed shall be such that individual aggregate weights, when batched cumulatively, can be clearly identified.</p> <p>8.8.3.2 The recorder shall record the proportions as indicated on the batching scale or meter within an accuracy of 0.5% of the maximum batch size.</p> <p>10. REQUIREMENTS FOR DRUM MIX PLANTS 10.1</p> <p>Control of Aggregate Gradation- The plant shall be equipped to control aggregate gradation in accordance with the requirements of Section 7.</p> <p>10.2 AGGREGATE DELIVERY SYSTEM</p> <p>10.2.1. Each cold feed bin shall have a device to feed the aggregate accurately and uniformly. No gravity-type feeders will be permitted. The feeding orifice shall be adjustable and indicators provided to show the gate opening. Each feeder shall be interlocked so that production is interrupted within 5 seconds if any cold bin becomes empty or the flow is obstructed.</p> <p>10.3 All aggregates shall be weighed by a continuous weighing device either as it is proportioned by the individual feeders or after all materials have been deposited on a common belt. Belt scales shall be installed according to the scale manufacturer's recommendations.</p> |

Appendix C

rev 3/1/06

| Test | Modification |
|------|---|
| | <p>Means shall be provided for diverting the aggregate after passing over the belt scale and prior to entry into the drum. The belt scale(s) shall have an accuracy requirement of $\pm .05\%$.</p> <p>10.4 All proportioning controls for aggregates, including mineral filler and asphalt, shall be located at the panel that also controls the mixer and temperature. The controls shall maintain aggregate flow accuracy such that the total variation of all materials being drawn per interval of time shall not exceed an amount equal to 1.5 percent of the total weight of bituminous mixture per interval of time. The feed rates of aggregates from the cold bins, mineral filler when used, and asphalt shall be established for each mix type initially by passing the individual aggregates and mineral filler over the continuous weighing device and the asphalt through the meter, respectively. The feed rates shall be checked periodically. Weight indicators shall display in the control room the weights of dry aggregate and mineral filler in tons per hour shall continuously accumulate the weights of material during the production period of the day. Where mineral filler is included in the aggregate passing over the belt scale, only one indicator will be required. The maximum resolution shall be 0.1 tons for dry aggregate and 0.01 tons for mineral filler if added separately. When mineral filler is to be added, it shall be fed from a bin and feeder separate from the aggregate cold bins. The system shall have a device to feed the mineral filler at adjustable rates accurately and uniformly. When mineral filler is proportioned separately, the delivery system shall be accurate to 0.1 percent based on the total weight of the bituminous mixture. The feeder shall be interlocked in such a manner such that no filler is lost in the form of fugitive dust. Where the separate addition of mineral filler is required, it shall be added with a maximum variation of 0.5 percent on the basis stated above for aggregates. The flow rate of aggregate shall be continuously displayed in the control room in tons per hour. The maximum resolution shall be 1 ton per hour for dry aggregate and 0.1 ton per hour for mineral filler if added separately.</p> <p>10.5 The plants shall be equipped with an automatic digital recording device that simultaneously records the weights of each aggregate, mineral filler if added separately and asphalt at five-minute intervals during production time and on demand. The recordation shall include the actual asphalt content based upon the quantity as a percentage of the total mixture weight. The maximum resolution shall be 0.1 tons for dry aggregate, 0.01 tons for mineral filler if added separately, 0.01 tons for asphalt and 0.1% for asphalt content. All recordings shall show the date, including day, month, year, and time to the nearest minute for each print.</p> <p>10.6 MOISTURE COMPENSATOR</p> <p>A moisture compensation device shall be capable of electronically changing the wet weight of aggregate to dry aggregate weight. The compensator may be set manually based on moisture tests performed on composite aggregate samples. The maximum graduations on the compensator shall be 0.1 percent. It shall be the daily responsibility of plant personnel to sample and determine the moisture content in the cold-feed aggregates.</p> <p>Additional moisture determinations shall be made as requested by the Engineer.</p> <p>A detailed record of the moisture determinations shall be kept and made available to the Engineer or his representative upon request.</p> <p>10.7 BITUMEN DELIVERY SYSTEM</p> <p>A meter shall proportion the asphalt and the meter shall be accurate to 0.1 percent based on the total weight of the HMA mixture. The system shall be interlocked so that production is interrupted within 5 seconds if the asphalt flow to the mixer unit ceases. A temperature-compensating device shall be installed in conjunction with the meter to correct the quantity of asphalt to 60F. The asphalt control shall be capable of presetting the actual asphalt content directly as a percentage based on total weight of mixture. The maximum graduation on the control shall be 0.1 percent. The asphalt delivery system shall be coupled with the aggregate delivery system to automatically maintain the required proportions as the aggregate flow varies. The delivery tolerance for asphalt shall be ± 0.1 percent of the total mixture weight. The flow rate of asphalt shall be continuously displayed in the control room and shall have a maximum resolution of 0.1 tons per hour. A quantity indicator shall display in the control room</p> |

Appendix C

rev 3/1/06

| Test | Modification |
|------|---|
| | <p>the quantity of asphalt and shall continuously accumulate the quantity of asphalt during the production period in the day. The maximum resolution shall be 0.01 tons. The indicators shall be able to be reset to zero and be locked.</p> <p>10.8 Mixer Unit The plant shall include a continuous mixer of a type, having an "automatic burner" control and capable of producing a uniform mixture within the job mix tolerances. Flights within the drum which are missing, loose, broken, bent, scalloped or worn excessively from their new condition shall be replaced to the satisfaction of the Engineer. The mixture shall be discharged into a hot bituminous mixture-holding bin meeting the requirements for storage bins (silos).</p> <p>RAP</p> <p>10.9 Mixing of RAP with this new aggregate shall occur before the binder introduction point. RAP shall be fed into the drum so that it will not come in direct contact with the burner flame.</p> <p>10.10 Automatic Aggregate Sampling Device: An automatic aggregate sampling device shall be provided which will divert a representative combined aggregate sample into a hopper or container for the purpose of gradation testing. The device shall effectively sample the full width and depth of the aggregate flow without losing any portion of the sample. The sampling point shall be after the aggregate is proportioned and prior to its mixing with asphalt.</p> <p>11 STORAGE BINS (SILOS):</p> <p>11.1 Storage time is defined as the time interval beginning with the discharge from HMA mixing unit to the time of completion of discharge from the holding bin. Each bin shall be inspected and/or tested by the Department to determine acceptance of the HMA mixture at specific storage times. Acceptance shall be based upon the ability of the bin to hold and discharge mixes within the quality criteria given below. The evaluation will be based on sampling and testing of stored mixtures unless otherwise directed. If the mixture drawn from a storage bin shows signs of detrimental aggregate segregation, asphalt migration, asphalt hardening or improper temperature control, the Director of Research and Materials may discontinue delivery from the storage bins until satisfactory results can be achieved. Unless so otherwise permitted by the Director of Research and Materials, the HMA mixtures shall not be stored in holding bins longer than the following periods:</p> <p style="padding-left: 40px;">Maximum Storage Time Type Bin All Classes</p> <ol style="list-style-type: none"> 1. Open Surge Bin 2 hr. 2. Unheated bin 4 hrs. 3. Heated; no inert gas in bin 8 hrs 4. Heated: inert gas in bin 14 hrs <p>Prior approval must be obtained for storage times greater than those indicated above. Mixtures will be evaluated for approval on an individual class basis as determined by the Director of Research and Materials. For verification of weights or proportions and character of materials and determination of temperatures used in the preparation of the mixture, the ConnDOT Laboratory personnel will have access at any time to all parts of the mixing plant. Acceptance Criteria for Mix Quality after Storage:</p> <ol style="list-style-type: none"> a. Temperature \pm 25F from pug mill discharge b. Gradation within job mix formula tolerances c. Asphalt Content within job mix formula tolerances |

Appendix C

rev 3/1/06

| Test | Modification |
|------|---|
| | <p>d. Asphalt Cement* Viscosity @ 140F 5500 poises when tested by AASHTO T 202 (* Recovered from mixture by AASHTO Method T170 (modified))</p> <p>Quantity Documentation: The quantity of mixture drawn from storage bins and delivered to department projects shall be weighted and recorded on scales meeting the requirements of Subarticle 4.06.1. Other quantity measuring and recording devices are permitted subject to the approval of the Director of Research and Materials. Coating on the bins internal surfaces or additives to the HMA mixes shall not be used unless specifically permitted by the Director of Research and Materials.</p> <p>The bins shall be equipped with a light or indicator to show when the level of material reaches the top of the discharge cone.</p> <p>The bins shall not be emptied below the top of the discharge cone until the use of the bin is completed each day.</p> <p>The material remaining in the discharge cone may be rejected if there is evidence of segregation upon discharge into the truck.</p> <p>The recovered asphalt from the mix samples shall meet requirements of Subarticle M.04.01-5.</p> <p>Samples for these tests will be taken from appropriate points in the conveyor system or trucks loaded from the bins.</p> <p>Report – Form 404 for Batch Plants and Form 405 Drum plants</p> |

| | | |
|-----------------|--|--|
| AASHTO T 308-05 | <p>In addition to the standard testing procedure, the State of Connecticut has adopted a procedure that addresses a correction factor that is calculated using the composite aggregate percentages (Composite Aggregate Correction Factor Method (CACF)).</p> <p>The aggregate is burned in compliance with the standard ASSHTO procedure. All modifications are listed for this method only.</p> <p>5.5. Omit. Replace with: The individual aggregate samples are to be dried in an oven at $105 \pm 5^{\circ}\text{C}$ ($221 \pm 9^{\circ}\text{F}$) for a minimum of 24 hours.</p> <p>6.2. Omit Note 2</p> <p>6.3. Omit.</p> <p>6.6. Omit. Replace with: Perform a gradation analysis on the burned blank and compare it to the gradation performed prior to burning.</p> <p>6.7. Omit.</p> <p>6.8. Omit.</p> <p>The correction factor for any material may now be calculated by multiplying the percent aggregate times the correction factor for that aggregate, then; by adding up all the individual factors from that material to come up with that materials correction factor.</p> <p>(Note: All correction factors must be re-calculated every time a materials percentage pulls change.)</p> | |
| ASTM D 2922 | <p>Density of soil and aggregate by Nuclear Methods</p> <p>See Section 5.25 of this Manual</p> | |
| ASTM D 2950 | <p>1.1 For thick-lift bituminous concrete overlays of 63 mm or greater in depth, testing shall be performed using the testing position recommended by the manufacturer such that 90 per cent of a single reading will be affected</p> <p>By the top 80 mm to 100 mm of material.</p> | |

Appendix C

rev 3/1/06

| Test | Modification | |
|---------------------------|---|--|
| | <p>1.2 For thin-lift bituminous concrete overlays 40 mm to 63 mm, the testing shall be performed using the testing position recommended by the manufacturer such that 90 percent of a single reading will be affected by the top 50 mm of material.</p> <p>1.3 For all tests, each test location will have two readings taken at 90-degree angles to each other (rotated around the center of the gauge). The density value reported will be the average of the two readings.</p> | |
| Federal Test Method 2012 | <p>PREPARATION OF TIN PANELS</p> <p>Section 1. Scope</p> <p>1.1 This method prescribes the type of tin panels to be used and the procedure to follow in their preparation for testing paints, varnish, lacquer, and related products.</p> <p>Section 2. Equipment</p> <p>2.1 Test panels general. The finished tin panel shall conform to the requirements of Fed. Spec. QQ-T-425 for Class A2 (best coke), Grade 1, 31 gauge ICL tinplate having a base mass per base box of 45.4 kg and equivalent mass per square meter of 0.20 kg.</p> <p>2.2 For flexibility tests. The tinplate specified in 2.1 shall be made by plating manufacturer's standard Gauge No., 31 (.27 mm), soft skin rolled temper (condition 4) steel sheet of nonaging quality conforming to Fed. Spec. QQ-S-698.</p> <p>2.2.1 Bending property. Panels (76.2 mm x 127 mm) cut at random from the plated sheet, when bent through an arc of 160 degrees over mandrels from 3.2 mm to 25.4 mm in diameter, shall conform to the circumference of each mandrel without any deformation such as bulging, buckling, or breaking.</p> <p>Section 3. Cleaning Solutions – Acetone</p> <p>3.1, 3.2 and note 1, are to be deleted and replaced by the following:</p> <p>3.1 Solvent- This solvent shall consist of A.C.S. certification acetone.</p> | |
| Modified Test Method 2141 | <p>APPLICATION OF BRUSHED FILMS</p> <p>Section 2. Application</p> <p>2.1 Delete the following four (4) sentences from Paragraph 2.1: "A Luer-type glass syringe shall be filled with the material under test and distributed over the panel quickly and uniformly spread at a predetermined or specified rate or wet film thickness. Then determine the mass the wetted brush and the Luer syringe filled with the coating materials. Re-determine the mass of the brush and syringe after application of coating. Spreading rate, if required, can be determined with this data."</p> | |
| Modified Test Method 4021 | <p>PIGMENT CONTENT (ORDINARY CENTRIFUGE MODIFIED)</p> <p>Section 2. Reagents</p> <p>3.1 Extraction Mixture A. Delete 6 volumes benzene - Fed. Spec. VV-B-231, and replace with the following:</p> <p>6 volumes 1, 1, 1 Trichlorethane, stabilized technical grade.</p> | |